

REMARKS**Objection to the Drawings**

The Examiner has objected to the drawings noting that the arrayed waveguide of claim 6 is not shown therein. Claim 6 is cancelled without prejudice. Accordingly, Applicants request the objection to be withdrawn.

Claim Objections

The Examiner has objected to claims 5, 24, and 40 stating that the Markush group should use the phrase “consisting of.” Applicants have amended claim 30 in the manner suggested by the Examiner. Claims 5 and 24 have been cancelled without prejudice.

Rejection under 35 U.S.C. § 101

The Examiner has rejected claims 18 and 37 under 35 U.S.C. § 101 stating that the recited “learning algorithm” is directed to non-statutory subject matter. The Examiner has stated that it is unclear how the algorithm learns. Office Action, page 3.

Applicants have amended claim 37 to recite --a computational learning algorithm--. Further details regarding computation learning algorithms are discussed in paragraph [0056] of the present application. Applicants submit that the claim 37 recites sufficient detail for a practical application or use (see MPEP § 2106(IV)(A)) and satisfies all requirements of 35 U.S.C. § 101. Claim 18 has been cancelled without prejudice.

Rejection under 35 U.S.C. § 112, second paragraph

The Examiner has rejected claims 1-49 under 35 U.S.C. § 112, second paragraph stating that the phrase “being operable to” does not define a structural connection or relationship. Applicants respectfully traverse the Examiner’s statement. Specifically, the phrase “being operable to” defines a functional relationship that substantively limits the respective element. However, to expedite prosecution of the present application, Applicants have rewritten the limitations employing the “being operable to” phrase. For example, in claim 26, the phrase “being operable to generate” has been replaced with --generating--. Applicants submit that these changes to the claims do not narrow the scope of the claims.

The Examiner has rejected claims 2 and 27 under 35 U.S.C. § 112, second paragraph stating that "no structure has been recited for establishing an external cavity." Applicants have amended claim 27 to recite --an external cavity comprising a plurality of optical components--. Applicants submit that, even though a plurality of optical components is broad, sufficient structure is recited for the external cavity. Claim 2 has been cancelled without prejudice.

The Examiner has rejected claims 3 and 28 under 35 U.S.C. § 112, second paragraph stating that essential structural relationship of elements are omitted. Applicants do not admit that structural relationships are essential matter between the elements recited in claim 28. However, to expedite prosecution, Applicants have amended claim 28 to recite structural limitations. Claim 3 has been cancelled without prejudice.

The Examiner has rejected claim 11 under 35 U.S.C. § 112, second paragraph stating that essential elements are omitted. Applicants do not admit that essential elements are omitted. Claim 11 has been cancelled without prejudice and, hence, the rejection of claim 11 is now moot.

Rejection under 35 U.S.C. § 102

Claims 1, 8, 12-20, 24, 25, 26, and 33-38 are rejected under 35 U.S.C. § 102 as being anticipated by U.S. Patent No. 5,894,362 issued to Onaka et al. (hereinafter Onaka).

It is well settled that to anticipate a claim, the reference must teach every element of the claim. *See* M.P.E.P. § 2131. Moreover, in order for a prior art reference to be anticipatory under 35 U.S.C. § 102 with respect to a claim, "[t]he elements must be arranged as required by the claim." *See* M.P.E.P. § 2131, citing *In re Bond*, 15 U.S.P.Q.2d 1566 (Fed. Cir. 1990). Furthermore, in order for a prior art reference to be anticipatory under 35 U.S.C. § 102 with respect to a claim, "[t]he identical invention must be shown in as complete detail as is contained in the . . . claim." *See* M.P.E.P. § 2131, citing *Richardson v. Suzuki Motor Co.*, 9 U.S.P.Q.2d 1913 (Fed. Cir. 1989). Applicants respectfully submit that the rejection does not satisfy these requirements.

Applicants note that claims 1-25 are cancelled without prejudice. Accordingly, these claims are not addressed herein.

Applicants have amended independent claims 26 and 39. The amendments are supported by, inter alia, paragraphs [0022]-[0059] of the original application. No new matter has been entered.

Claim 26 is directed to a method for providing a dynamically spectrally tailored Raman pump, said Raman pump generating Raman gain for a plurality of signal wavelengths. The method comprises:

- providing a plurality of gain elements, said plurality of gain elements generating said Raman pump that comprises a plurality of spectral components;
- driving said plurality of gain elements utilizing a plurality of current sources, each current source of said plurality of current sources driving at least one gain element of said plurality of gain elements by a variable current;
- providing said Raman pump to an optical medium;
- determining power levels associated with said plurality of signal wavelengths; and
- adjusting variable currents of said plurality of current sources utilizing in part said power levels associated with said plurality of signal wavelengths wherein said adjusting causes dynamic spectral tailoring of said Raman pump.

Applicants submit that claim 26 is directed to substantially different subject matter than Onaka. First, claim 26 involves a Raman amplifier. A Raman amplifier is an amplifier that relies upon the Raman effect as the physical mechanism to amplify optical signals. Onaka does not disclose a Raman amplifier. The only specific type of amplifier disclosed by Onaka is an erbium doped fiber (EDF) amplifier. *See* col. 8, lines 31-36. An EDF amplifier does not rely upon the Raman effect to amplify optical signals. The Examiner attempts to overcome this issue by stating that a nonlinear amplifier “will produce Raman effects.” Office Action, page 4. Nonetheless, whether or not some sort of de minimis Raman effects may occur in association with a nonlinear amplifier, it is uncontroverted that the amplifiers disclosed in Onaka do not rely upon the Raman effect to amplify optical signals.

Moreover, claim 26 requires spectral tailoring of a Raman pump that comprises a plurality of spectral components. A Raman pump is an optical signal utilized to excite or pump a Raman amplifier so that the Raman amplifier will amplify other optical signals. Onaka further does not disclose pump light that comprises a plurality of spectral components. Moreover, Onaka does not disclose spectral tailoring a pump in the manner recited by claim 26 and 39. Instead, Onaka only discloses varying the “power of pump light in optical amplifier 38.” Col. 8, lines 58-60.

The Examiner has also stated that the laser array system of Onaka can be used to pump the nonlinear amplifier of Onaka. Office Action, page 4. Applicants respectfully traverse the Examiner's statement. Onaka merely discloses that laser diodes 24 of the Onaka system output the wave division multiplexed (WDM) channels. Col. 6, lines 45-51. The WDM channels are the optical signals being amplified and are not used to pump the optical amplifier. Specifically, Onaka discusses the pump light used to excite optical amplifier 38 completely separately from the WDM channels generated by laser diodes 24. *See* col. 8, lines 26-44.

Therefore, Onaka does not disclose each and every limitation of claim 26. Claims 33-38 depend from claim 26 and, hence, inherit all limitations of claim 26. Claims 26 and 33-38 are not anticipated by Onaka.

Moreover, the subject matter of claim 26 is advantageous when compared to systems such as the system shown in Onaka. Specifically, WDM systems based upon EDF amplifiers involve using equalizers to cause the optical power in each channel to become substantially constant. As acknowledged by Onaka, gain compensation by a gain equalizer is accompanied by a degradation of the signal-to-noise ratios of the WDM channels. Onaka, col. 12, lines 16-17. No such gain equalization is required by claim 26. Instead, gain may be controlled by spectrally tailoring the Raman pump as appropriate. Therefore, claims 26 and 33-38 are also nonobvious.

Rejection under 35 U.S.C. § 103(a)

Claims 2-7, 9-11, 21-23, 27-29, 31, 32 and 39-49 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Onaka in view of U.S. Patent No. 6,456,756 issued to Mead et al. (hereinafter Mead).

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art cited must teach or suggest all the claim limitations. *See* M.P.E.P. § 2143. Applicants submit that the rejection does not satisfy these criteria.

As previously noted, claims 1-25 have been cancelled.

The method of claim 26 comprises:

- providing a plurality of gain elements, said plurality of gain elements generating said Raman pump that comprises a plurality of spectral components;
- driving said plurality of gain elements utilizing a plurality of current sources, each current source of said plurality of current sources driving at least one gain element of said plurality of gain elements by a variable current;
- providing said Raman pump to an optical medium;
- determining power levels associated with said plurality of signal wavelengths; and
- adjusting variable currents of said plurality of current sources utilizing in part said power levels associated with said plurality of signal wavelengths wherein said adjusting causes dynamic spectral tailoring of said Raman pump.

Claim 39 is directed to a system for providing Raman gain to a plurality of signal wavelengths. The system comprises:

- a plurality of gain elements producing output beams;
- a collimating optic focusing said output beams on a dispersive element;
- said dispersive element combining said output beams as a Raman pump that comprises a plurality of spectral components; and
- a controller device causing said plurality of gain elements to operate at variable power levels in response to received information indicative of Raman gain produced by said Raman pump on said plurality of signal wavelengths, wherein operation of said plurality of gain elements at variable power levels cause dynamic spectral tailoring of said Raman pump.

For the reasons discussed above with regard to the rejection under 35 U.S.C. § 102, Onaka does not teach or suggest each and every limitation of claim 26 and 39. Furthermore, Mead does not teach or suggest dynamically tailoring a Raman pump in the manner recited by claims 26 and 39.

Therefore, the cited art (either alone or in combination) does not teach or suggest each and every limitation of claims 26 and 39. Claims 27-29, 31, 32 and 40-49 respectively depend from base claims 26 and 39 and, hence, inherit all limitations of their respective base claim. A prima facie case of obviousness has not been established for claims 26-29, 31, 32 and 39-49.

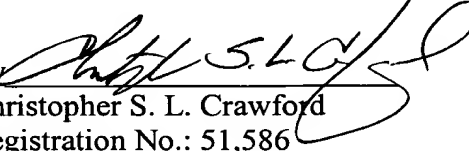
Conclusion

In view of the above, each of the presently pending claims in this application is believed to be in immediate condition for allowance. Accordingly, the Examiner is respectfully requested to pass this application to issue.

Applicant believes no fee is due with this response. However, if a fee is due, please charge Deposit Account No. 06-2380, under Order No. 60988/P002US/10103486 from which the undersigned is authorized to draw.

Dated: January 6, 2004

Respectfully submitted,

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